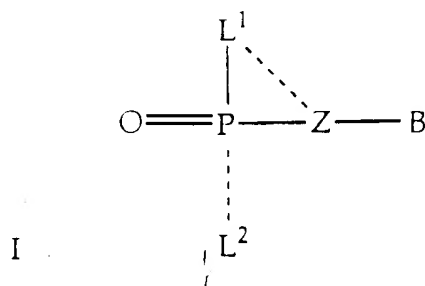


What is claimed is:

1. A compound of the formula I



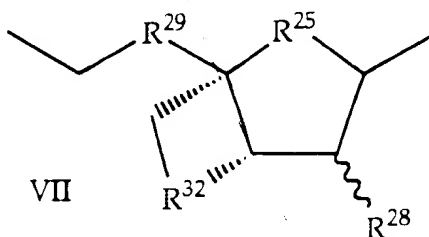
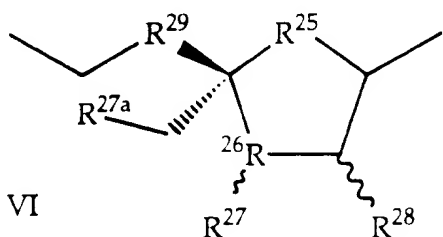
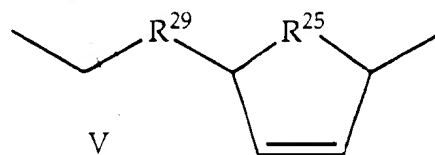
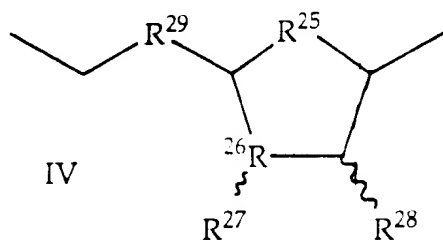
5

or a physiologically acceptable salt thereof, wherein

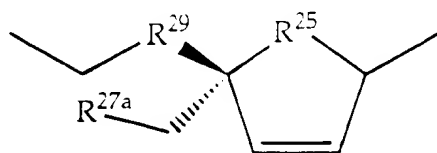
L^1 and L^2 are independently an amino acid or polypeptide residue bonded to the phosphorus atom of the compound by an amide bond, or L^1 and L^2 are independently an oxyster, thioester, a substituted or unsubstituted amine, or hydroxy, provided that one or both of L^1 and L^2 is an amino acid or polypeptide residue and provided that any carboxyl group that is linked by less than 5 atoms to the amide N is esterified or amidated and the dotted lines represent facultative bonds;

Z is $-\text{CHR}^7-\text{R}^{11}-(\text{CH}_2)_{m1}-\text{C}^{\#}(\text{R}^8)((\text{CH}_2)_{m2}(\text{R}^9))-(\text{CH}_2)_{m3}-\text{R}^{10}-(\text{CH}_2)_{m4}-$, $-\text{Q}-$, $\text{C}_6\text{H}_4-\text{CH}_2-$, $-\text{CHR}^7-\text{O}-\text{CHR}^7-\text{O}-\text{CHR}^7-$, $-\text{CHR}^7-(\text{CHR}^{13})_{m1}-\text{CHR}^{14}-\text{R}^{10}-$,

15



20



or VIII

R^7 is H or C_1 - C_4 alkyl;

$R^8 = R^7$ or C_2 - C_4 alkenyl, azidomethyl or azidoethyl;

R^9 is halogen (F, Cl, Br or I), H or OH;

5 R^{10} is O, CH_2 or a chemical bond;

R^{11} is O, S, CH_2 , CHF, CF_2 ;

Q is $-C(R^{12})_2-CH_2-$, $-C(R^{12})_2-O-$, $-CR^{12}=CR^{12}-$, or $-C\equiv C-$, wherein each R^{12} is independently H, or halogen;

R^{13} is H, halogen, OH, CH_3 , CH_2OH , or C_3 - C_{12} acyloxymethyl;

10 R^{14} is independently H, halogen, OH, CH_3 , CH_2OH , C_3 - C_{12} acyloxymethyl, or C_2 - C_{12} acyloxy;

R^{25} is CH_2 , CHF or O;

R^{26} is CH or S, provided that when R^{25} is CH, R^{26} is not S;

R^{27} is H, OH, halogen, N_3 , C_1 - C_4 alkyl, C_1 - C_4 alkoxy or when, R^{26} is S,

15 R^{27} is absent;

R^{27a} is H, OH, halogen, N_3 , C_1 - C_4 alkyl, C_1 - C_4 alkoxy;

$R^{28} = R^{27a}$ and is independently chosen;

R^{29} is O, S, CH_2 , CHF, CF_2 ;

R^{32} is O;

20 $m_1 = m_2 = m_3 = m_4$ is an integer having a value from 0 to 4 wherein each is independently chosen;

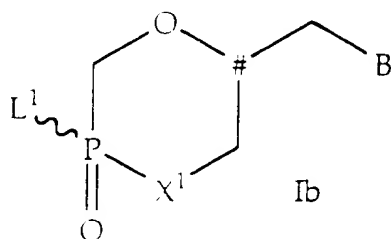
the carbon atom designated $C^\#$ has linked substituents that are in the R, S or RS configuration; and

B is a heterocyclic base.

25

30

2. A compound of the formula Ib



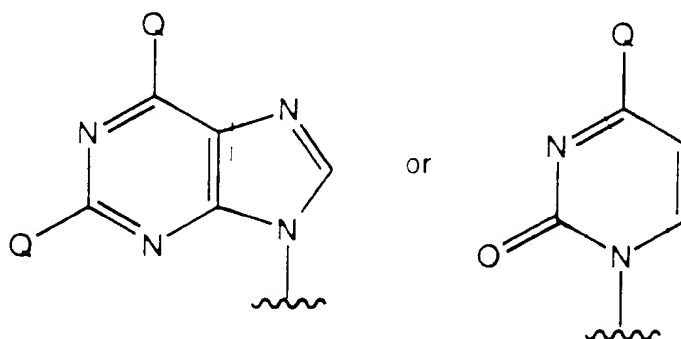
and stereoisomers and salts of such compounds wherein

X^1 is O or S;

L^1 is an amino acid, a polypeptide residue, a substituted or
5 unsubstituted amine, an oxyester or a thio ester; and

the carbon atom designated # has linked substituents that are in the *R*,
S or *RS* configuration, provided that L^1 is not a C_1 - C_4 alkyl ester or, when
when B is cytosin-1-yl, then L^1 is not $OCH_2C(O)NR^{5a}_2$, $OCH_2C(O)OR^{5a}$,
 $OCH_2OC(O)R^{5a}$, $OCH(R^{5a})OC(O)R^{5a}$ (*R*, *S* or *RS* stereochemistry),
10 $OCH_2C(R^{5a})_2CH_2OH$, OCH_2OR^{5a} , OR^{5a} , NHR^{5a} or NR^{5a}_2 wherein R^{5a} is
 C_1 - C_{20} alkyl, aryl or aryl-alkyl which may be substituted or unsubstituted by
substituents independently selected from the group consisting of hydroxy and
halogen, and provided that when X^1 is O and B is adenine, cytosine, guanine,
thymine, uracil, 2,6-diamino purine, hypoxanthine, or Z^2 ; wherein Z^2 is

15

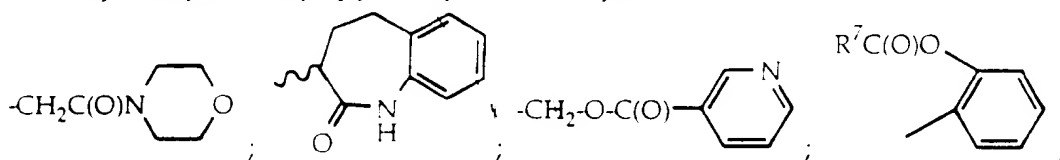


Q is independently chosen from H, Cl, NHR^X , NR^X_2 , $NHC(O)R^X$,
 $N(C(O)R^X)_2$, OH or $NCHN(R^X)_2$, then L^1 is not OR^Y , NH_2 , NHR^X , or $N(R^X)_2$
20 where R^Y represents a physiologically hydrolyzable ester group selected from
the group consisting of $CH_2C(O)N(R^X)_2$, $CH_2C(O)OR^X$, $CH_2OC(O)R^X$,
 $CH(R^X)OC(O)R^X$, $CH_2C(R^X)_2CH_2OH$, or CH_2OR^X ; R^Y may also be R^X provided
that R^Y and R^X are not simultaneously alkyl;

R^X represents C_1 - C_{20} alkyl, aryl or aryl-alkyl which may be substituted or unsubstituted by substituents independently selected from the group consisting of hydroxy, oxygen, nitrogen and halogen.

5 3. The compound of claim 2 wherein L^1 is NHR^{40} or OR^{31} wherein R^{40} is C_1 - C_{20} alkyl;

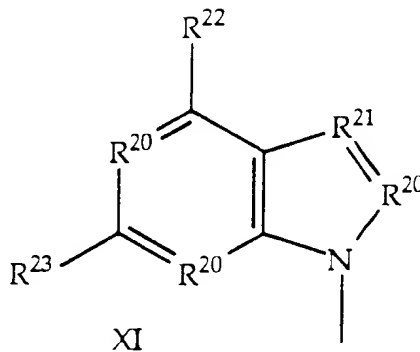
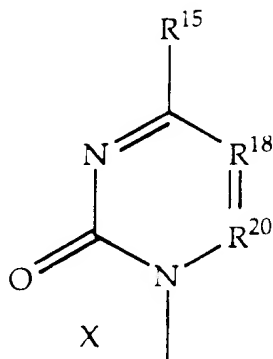
R^{31} is 2,3-dihydro-6-hydroxyindene; sesamol; catechol monoester; $-\text{CH}_2\text{-C(O)-N(R}^7)_2$ wherein each R^7 the same or different; $-\text{CH}_2\text{-S(O)(R}^7)$; $-\text{CH}_2\text{-S(O)}_2(\text{R}^7)$; $-\text{O-CH}_2\text{-CH(OC(O)CH}_2\text{R}^7)\text{-CH}_2\text{(OC(O)CH}_2\text{R}^7)$; cholesteryl; a
10 monosaccharide; a disaccharide; an oligosaccharide (3 to 9 monosaccharide residues), enolpyruvate; glycerol; an α -D- β -diglyceride; trimethoxybenzyl; triethoxybenzyl; 2-alkyl pyridinyl (C_{1-4} alkyl);



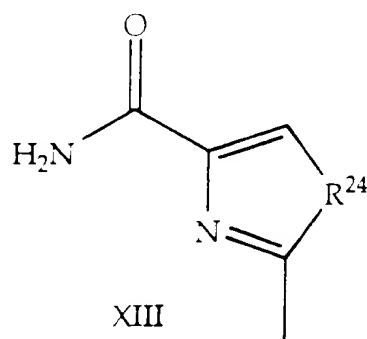
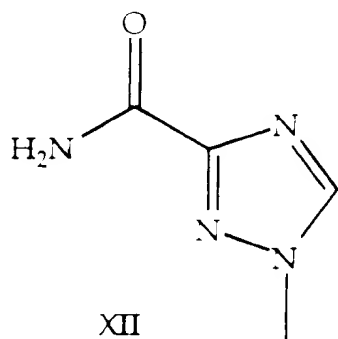
C_3 - C_6 aryl substituted by 3, 4 or 5 halogen atoms or 1 or 2 atoms or
15 groups selected from halogen, C_1 - C_{12} alkoxy, cyano, nitro, OH, C_1 - C_{12} haloalkyl, C_1 - C_{12} alkyl, C_2 - C_{12} alkenyl or C_2 - C_{12} alkynyl; or

C_1 - C_4 alkylene- C_3 - C_6 aryl substituted in the aryl moiety by 3 to 5
halogen atoms or 1 to 2 atoms or groups selected from halogen, C_1 - C_{12} alkoxy, cyano, nitro, OH, C_1 - C_{12} haloalkyl, C_1 - C_{12} alkyl, C_2 - C_{12} alkenyl or C_2 - C_{12}
20 alkynyl.

4. The compound of claim 3 wherein B is



25



wherein R^{15} is H, OH, F, Cl, Br, I, OR^{16} , SH, SR^{16} , NH_2 , or NHR^{17} ;

R^{16} is $C_1 - C_6$ alkyl

5 R^{17} is $C_1 - C_6$ alkyl;

R^{18} is N, CF, CCl, CBr, Cl, CR^{19} or CSR^{19} , COR^{19} ;

R^{19} is H, $C_1 - C_9$ alkyl, $C_2 - C_9$ alkenyl, $C_2 - C_9$ alkynyl or $C_7 - C_9$ aryl-alkyl unsubstituted or substituted by OH, O, N, F, Cl, Br or I;

R^{20} is N or CH;

10 R^{21} is N, CH, CCN, CCF_3 , $CC\equiv CH$ or $CC(O)NH_2$;

R^{22} is H, OH, NH_2 , SH, SCH_3 , SCH_2CH_3 , SCH_2CCH , SCH_2CHCH_2 , SC_3H_7 , $NH(CH_3)$, $N(CH_3)_2$, $NH(CH_2CH_3)$, $N(CH_2CH_3)_2$, $NH(CH_2CCH)$, $NH(CH_2CHCH_2)$, $NH(C_3H_7)$ or halogen;

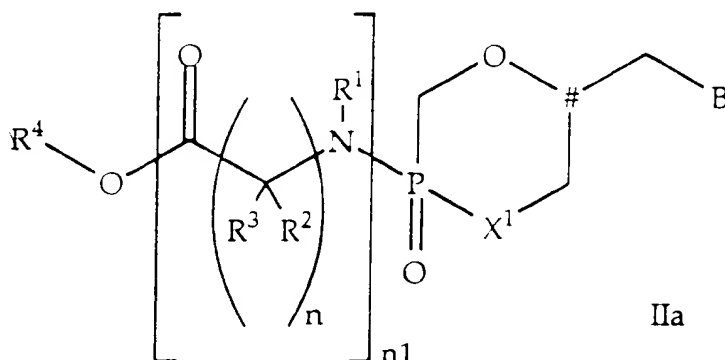
R^{23} is H, OH, F, Cl, Br, I, SCH_3 , SCH_2CH_3 , SCH_2CCH , SCH_2CHCH_2 , SC_3H_7 , OR^{16} , NH_2 , or NHR^{17} ; and

R^{24} is O, S or Se.

5. The compound of claim 4 wherein B is cytosin-1-yl, 6-azacytosin-1-yl, 5-fluorocytosin-1-yl, adenin-9-yl, guanin-9-yl or 2, 6-diaminopurin-9-yl.

6. The compound of claim 4 wherein R^{31} is 2-methoxyphenyl, 3-methoxyphenyl, 4-methoxyphenyl, 2-fluorophenyl, 3-fluorophenyl, 4-fluorophenyl, 2-ethoxy-5-hydroxyphenyl, 2-ethoxy-4-hydroxyphenyl, 3,5-dimethoxyphenyl, 2,4-difluorophenyl, 2-(haloalkyl)-phenyl, 3-(haloalkyl)phenyl, 4-(haloalkyl)-phenyl, 2-cyanophenyl, 3-cyanophenyl, 4-cyanophenyl, 2-ethoxyphenyl, 3-ethoxyphenyl, 4-ethoxyphenyl, 2-carboethoxyphenyl, 3-carboethoxyphenyl, 4-carboethoxyphenyl, or 2-haloalkylbenzyl, 3-haloalkylbenzyl or 4-haloalkylbenzyl.

7. The compound of claim 2 of the formula IIa



5 wherein

n is 1, 2, 3, 4 or 5, wherein for $n > 1$, each $-C(R^2)(R^3)$ is the same or different;

n_1 is an integer;

R^1 is H or C_1 - C_9 alkyl which is unsubstituted or substituted by
 10 substituents independently selected from the group consisting of OH, O, N, $COOR^4$ and halogen, C_3 - C_6 aryl which is unsubstituted or substituted by substituents independently selected from the group consisting of OH, O, N, $COOR^4$ and halogen or C_3 - C_9 aryl-alkyl which is unsubstituted or substituted by substituents independently selected from the group consisting of OH, O, N, $COOR^4$ and halogen;
 15

$R^2 = R^1$ and is independently chosen;

R^3 is $C(O)-OR^4$, amino, C_1 - C_3 alkylamino, C_1 - C_3 alkyldiamino, C_1 - C_6 alkenylamino, hydroxy, thiol, C_1 - C_3 alkoxy, C_1 - C_3 alkthiol, $(CH_2)_nCOOR^4$, C_1 - C_6 alkyl which is unsubstituted or substituted with OH, halogen, SH, NH_2 ,
 20 phenyl, hydroxyphenyl or C_7 - C_{10} alkoxyphenyl; C_2 - C_6 alkenyl which is unsubstituted or substituted with OH, halogen, SH, NH_2 , phenyl, hydroxyphenyl or C_7 - C_{10} alkoxyphenyl; C_6 - C_{12} aryl which is unsubstituted or substituted with OH, halogen, SH, NH_2 , phenyl, hydroxyphenyl or C_7 - C_{10} alkoxyphenyl; and

R^4 is H provided that n_1 greater than 1, or is C_3 - C_9 alkyl which is substituted by substituents independently selected from the group consisting of OH, O, N and halogen, C_3 - C_6 aryl which is substituted by substituents independently selected from the group consisting of OH, O, N and halogen or
 25

C₃-C₉ aryl-alkyl which is substituted by substituents independently selected from the group consisting of OH, O, N and halogen.

8. The compound of claim 7 wherein

5 n and n₁ are 1;

R¹ is H, methyl, phenyl or benzyl;

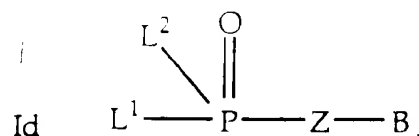
R² is H;

10 R³ is H, -CH₃, -CH(CH₃)₂, -CH₂-CH(CH₃)₂, -CHCH₃-CH₂-CH₃, -CH₂-C₆H₅, -CH₂CH₂-S-CH₃, -CH₂OH, -CH(OH)-CH₃, -CH₂-SH, -CH₂-C₆H₄OH, -CH₂-CO-NH₂, -CH₂-CH₂-CO-NH₂, -CH₂-COOH, -CH₂-CH₂-COOH, -(CH₂)₄-NH₂, -(CH₂)₃-NH-C(NH₂)-NH₂, 1-guanidinoprop-3-yl, benzyl, 4-hydroxybenzyl, imidazol-4-yl, indol-3-yl, methoxyphenyl or ethoxyphenyl; and

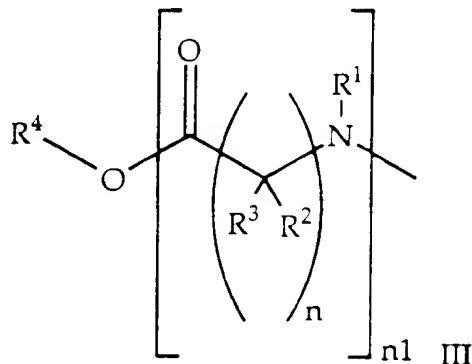
15 R⁴ is methyl, ethyl, propyl, isopropyl, butyl, t-butyl, phenyl, benzyl, 1-pyridyl, 3-pyridyl, 1-pyrimidinyl, pivaloyloxymethyl, N-ethylmorpholino, N-2-propylmorpholino, methoxyethyl, 4-N-methylpiperidyl, 3-N-methylpiperidyl, 2-, 3-, or 4-N,N-dimethylaminophenyl, 2-, 3-, or 4-N,N-diethylaminophenyl or 1-ethylpiperazinyl.

20 9. The compound of claim 8 wherein B is cytosin-1-yl, 6-azacytosin-1-yl, adenin-9-yl, guanin-9-yl or 2, 6-diaminopurin-9-yl, and X¹ is O.

10. The compound of claim 1 of the formula Id



25 11. The compound of claim 10 wherein L¹ is of the formula III



wherein

n is 1, 2, 3, 4 or 5, wherein for $n > 1$, each $-C(R^2)(R^3)$ is the same or different;

n_1 is an integer;

5 R^1 is H or C_1 - C_9 alkyl which is unsubstituted or substituted by substituents independently selected from the group consisting of OH, O, N, $COOR^4$ and halogen, C_3 - C_6 aryl which is unsubstituted or substituted by substituents independently selected from the group consisting of OH, O, N, $COOR^4$ and halogen or C_3 - C_9 aryl-alkyl which is unsubstituted or substituted
10 by substituents independently selected from the group consisting of OH, O, N, $COOR^4$ and halogen;

$R^2 = R^1$ and is independently chosen;

R^3 is $C(O)-OR^4$, amino, C_1 - C_3 alkylamino, C_1 - C_3 alkyl diamino, C_1 - C_6 alkenylamino, hydroxy, thiol, C_1 - C_3 alkoxy, C_1 - C_3 alkthiol, $(CH_2)_nCOOR^4$,
15 C_1 - C_6 alkyl which is unsubstituted or substituted with OH, halogen, SH, NH_2 , phenyl, hydroxyphenyl or C_7 - C_{10} alkoxyphenyl; C_2 - C_6 alkenyl which is unsubstituted or substituted with OH, halogen, SH, NH_2 , phenyl, hydroxyphenyl or C_7 - C_{10} alkoxyphenyl; C_6 - C_{12} aryl which is unsubstituted or substituted with OH, halogen, SH, NH_2 , phenyl, hydroxyphenyl or C_7 - C_{10}
20 alkoxyphenyl; and

R^4 is H provided that n_1 greater than 1, or is C_3 - C_9 alkyl which is substituted by substituents independently selected from the group consisting of OH, O, N and halogen, C_3 - C_6 aryl which is substituted by substituents independently selected from the group consisting of OH, O, N and halogen or
25 C_3 - C_9 aryl-alkyl which is substituted by substituents independently selected from the group consisting of OH, O, N and halogen;

L^2 is OR, SR or is the same as L^1 wherein,

R is H,

30 C_3 - C_{24} acyloxyalkyl,
 C_6 - C_{24} acyloxyarylalkyl,
 C_3 - C_{24} acyloxyalkoxyalkyl,
 C_3 - C_{24} acyloxyhaloalkyl,

C_1 - C_{20} alkyl which is unsubstituted or substituted by substituents independently selected from the group consisting of OH, O, N and halogen (F, Cl, Br, I),
35

C₃-C₂₀ aryl which is unsubstituted or substituted by substituents independently selected from the group consisting of C₁-C₆ alkyl, C₁-C₆ alkoxy, C₁-C₆ haloalkyl (1 to 3 halogen atoms), cyano, nitro, OH, O, N and halogen, or

5 C₄-C₂₀ aryl-alkyl which is unsubstituted or substituted in the aryl moiety by substituents independently selected from the group consisting of C₁-C₆ alkyl, C₁-C₆ alkoxy, C₁-C₆ haloalkyl (1 to 3 halogen atoms), cyano, nitro, OH, O, N and halogen.

12. The compound of claim 11 wherein
10 n and n1 are 1;

R is N-ethylmorpholino, pivaloyloxymethyl, phenyl, benzyl, isopropyl, t-butyl, ethyl, isopropyl, butyl, adamantoyloxymethyl, 3-methoxyphenyl, 2-carboethoxyphenyl, 4-fluorophenyl, 2,4-difluorophenyl, 3,5-dimethoxyphenyl, 2,4-dichlorophenyl, 2-ethoxyphenyl, 3-dimethylaminophenyl, 4-trifluoromethylbenzyl, 2-ethylsalicyl, -O-CH₂-O-C(O)-C₁₀H₁₅, -C₆H₄-CH₂-N(CH₃)₂, -CH₂-CH₂F, -CH₂-CH₂Cl, -CH₂-CF₃, -CH₂-CCl₃, R⁵, NHR⁶ or N(R⁶)₂
15 wherein,

R⁵ is CH₂C(O)N(R⁶)₂, CH₂C(O)OR⁶, CH₂OC(O)R⁶, CH(R⁶)OC(O)R⁶, CH₂C(R⁶)₂CH₂OH, or CH₂OR⁶, and
20 R⁶ is C₁-C₂₀ alkyl which is unsubstituted or substituted by substituents independently selected from the group consisting of OH, O, N and halogen (1 to 5 halogen atoms), C₆-C₂₀ aryl which is unsubstituted or substituted by substituents independently selected from the group consisting of OH, O, N and halogen (1 to
25 5 halogen atoms) or C₇-C₂₀ aryl-alkyl which is unsubstituted or substituted by substituents independently selected from the group consisting of OH, O, N and halogen (1 to 5 halogen atoms);

R¹ is H, methyl, ethyl, isopropyl, phenyl or benzyl;

R² is H;

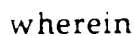
30 R³ is H, -CH₃, -CH(CH₃)₂, -CH₂-CH(CH₃)₂, -CHCH₃-CH₂-CH₃, -CH₂-C₆H₅, -CH₂CH₂-S-CH₃, -CH₂OH, -CH(OH)-CH₃, -CH₂-SH, -CH₂-C₆H₄OH, -CH₂-CO-NH₂, -CH₂-CH₂-CO-NH₂, -CH₂-COOH, -CH₂-CH₂-COOH, -(CH₂)₄-NH₂, -(CH₂)₃-NH-C(NH₂)-NH₂, 1-guanidinoprop-3-yl, benzyl, 4-hydroxybenzyl, imidazol-4-yl, indol-3-yl, methoxyphenyl or ethoxyphenyl; and

35 R⁴ is methyl, ethyl, propyl, isopropyl, butyl, t-butyl, phenyl, benzyl, 1-pyridyl, 3-pyridyl, 1-pyrimidinyl, pivaloyloxymethyl, N-ethylmorpholino, N-

13. The compound of claim 12 wherein Z is $-\text{CHR}^7\text{-R}^{11}\text{-(CH}_2\text{)}_{\text{m1}}\text{-C(R}^8\text{)((CH}_2\text{)}_{\text{m2}}\text{(R}^9\text{))-(CH}_2\text{)}_{\text{m3}}\text{-R}^{10}\text{-(CH}_2\text{)}_{\text{m4}}\text{-}$



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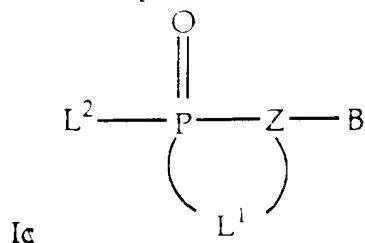


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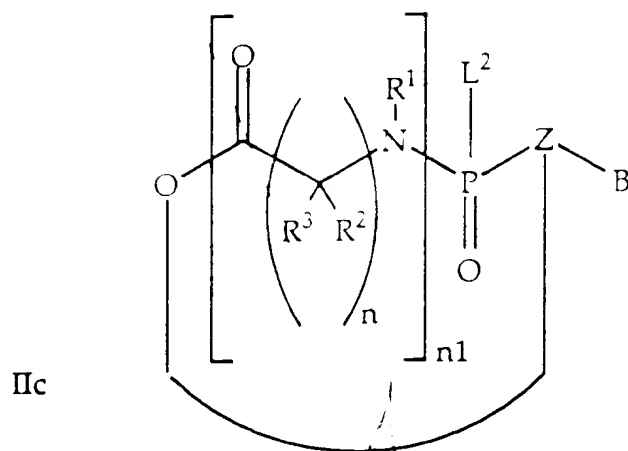
R²⁷ and R²⁸ are H; and

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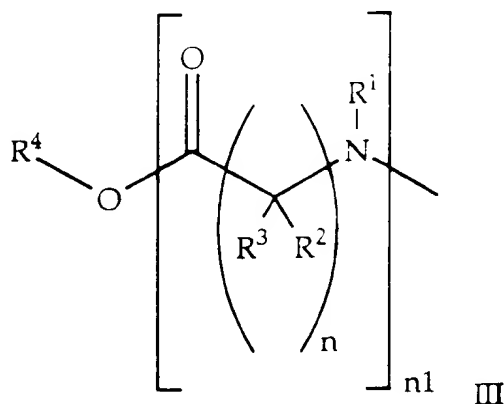
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16. The compound of claim 15 of the formula IIc



wherein L^2 is OR, SR or



wherein

R is H,

C₃-C₂₄ acyloxyalkyl,

C₆-C₂₄ acyloxyarylalkyl,

C₃-C₂₄ acyloxyalkoxyalkyl,

C₃-C₂₄ acyloxyhaloalkyl,

C₁-C₂₀ alkyl which is unsubstituted or substituted by substituents independently selected from the group consisting of OH, O, N and halogen (F, Cl, Br, I),

5 C₃-C₂₀ aryl which is unsubstituted or substituted by substituents independently selected from the group consisting of C₁-C₆ alkyl, C₁-C₆ alkoxy, C₁-C₆ haloalkyl (1 to 3 halogen atoms), cyano, nitro, OH, O, N and halogen, or

C₄-C₂₀ aryl-alkyl which is unsubstituted or substituted in the aryl moiety by substituents independently selected from the group consisting of
10 C₁-C₆ alkyl, C₁-C₆ alkoxy, C₁-C₆ haloalkyl (1 to 3 halogen atoms), cyano, nitro, OH, O, N and halogen; and

R¹ is O-C₆H₄-CH₂-N(CH₃)₂, OR⁵, NHR⁶ or N(R⁶)₂ wherein R⁵ is CH₂C(O)N(R⁶)₂, CH₂C(O)OR⁶, CH₂OC(O)R⁶, CH(R⁶)OC(O)R⁶, CH₂C(R⁶)₂CH₂OH, or CH₂OR⁶, and wherein R⁶ is C₁-C₂₀ alkyl, C₆-C₂₀ aryl or
15 C₇-C₂₀ aryl-alkyl which is unsubstituted or substituted by substituents independently selected from the group consisting of OH, O, N and halogen.

17. A compound of the formula (OR³¹)₂P(O)-Z¹-B or (OR)(OR³¹)P(O)-Z¹-B, wherein;

20 B is a heterocyclic base;

Z¹ is selected from the group consisting of -CH₂-O-CH₂-CH₂-, -CH₂-O-C#H(CH₂OH)-CH₂-, -CH₂-O-C#H(CH₃)-CH₂-, -CH₂-O-C#H(CH₂F)-CH₂-, -CH₂-O-C#H(CH=CH₂)-CH₂- and -CH₂-O-C#H(CH₂N₃)-CH₂-;

R is H,

25 C₃-C₂₄ 1-acyloxy-1-alkyl,

C₆-C₂₄ 1-acyloxy-1-aryl-1-alkyl,

C₃-C₂₄ 1-acyloxy-2-alkoxy-1-alkyl,

C₃-C₂₄ 1-acyloxy-2-halo-1-alkyl,

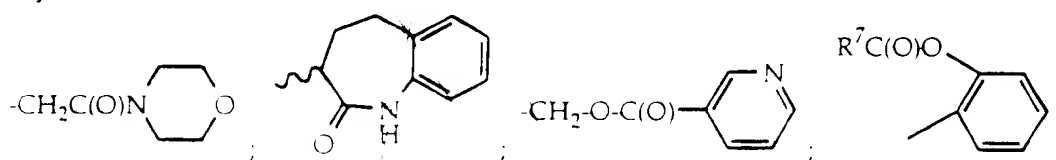
C₁-C₂₀ alkyl which is unsubstituted or substituted by substituents independently selected from the group consisting of OH, O, N and halogen (F, Cl, Br, I),

C₃-C₂₀ aryl which is unsubstituted or substituted by substituents independently selected from the group consisting of C₁-C₆ alkyl, C₁-C₆ alkoxy, C₁-C₆ haloalkyl, cyano, nitro, OH, O, N and halogen, or

C₄-C₂₀ aryl-alkyl which is unsubstituted or substituted in the aryl moiety by substituents independently selected from the group consisting of C₁-C₆ alkyl, C₁-C₆ alkoxy, C₁-C₆ haloalkyl, cyano, nitro, OH, O, N and halogen;

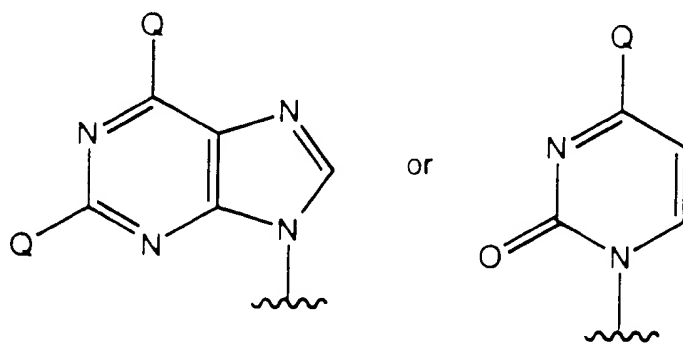
R³¹ is 2,3-dihydro-6-hydroxyindene; sesamol; catechol monoester;

- 5 -CH₂-C(O)-N(R⁷)₂ wherein each R⁷ is hydrogen or C₁₋₄ alkyl and is the same or different; -CH₂-S(O)(R⁷); -CH₂-S(O)₂(R⁷); -O-CH₂-CH(OC(O)CH₂R⁷)-CH₂(OC(O)CH₂R⁷); cholesteryl; a monosaccharide; a disaccharide; an oligosaccharide (3 to 9 monosaccharide residues), enolpyruvate; glycerol; an α-D-β-diglyceride; trimethoxybenzyl; triethoxybenzyl; 2-alkyl pyridinyl (C₁₋₄ alkyl);



C₃-C₆ aryl substituted by 3, 4 or 5 halogen atoms or 1 or 2 atoms or groups selected from halogen, C₁-C₁₂ alkoxy, cyano, nitro, OH, C₁-C₁₂ haloalkyl, C₁-C₁₂ alkyl, C₂-C₁₂ alkenyl or C₂-C₁₂ alkynyl; or

- 15 C₁-C₄ alkylene-C₃-C₆ aryl substituted in the aryl moiety by 3 to 5 halogen atoms or 1 to 2 atoms or groups selected from halogen, C₁-C₁₂ alkoxy, cyano, nitro, OH, C₁-C₁₂ haloalkyl, C₁-C₁₂ alkyl, C₂-C₁₂ alkenyl or C₂-C₁₂ alkynyl, provided that when Z¹ is -CH₂-O-CH₂-CH₂- and B is adenin-9-yl, both R³¹ are not 4-nitrobenzyl or 4-trifluoromethylbenzyl, and provided that
- 20 when Z¹ is -CH₂-O-CH₂-CH₂-, -CH₂-O-C#H(CH₂OH)-CH₂-, -CH₂-O-C#H(CH₃)-CH₂-, -CH₂-O-C#H(CH₂F)-CH₂- or -CH₂-O-C#H(CH=CH₂)-CH₂- and B is adenine, cytosine, guanine, thymine, uracil, 2,6-diamino purine, hypoxanthine, or Z²; wherein Z² is



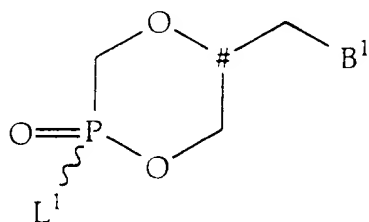
Q is independently chosen from H, Cl, NHR^X , NR^X_2 , NHC(O)R^X , $\text{N(C(O)R}^X)_2$, OH or $\text{NCHN(R}^X)_2$, then L^1 is not OR^Y , NH_2 , NHR^X , or $\text{N(R}^X)_2$ where R^Y represents a physiologically hydrolyzable ester group selected from the group consisting of $\text{CH}_2\text{C(O)N(R}^X)_2$, $\text{CH}_2\text{C(O)OR}^X$, $\text{CH}_2\text{OC(O)R}^X$, $\text{CH(R}^X)\text{OC(O)R}^X$, $\text{CH}_2\text{C(R}^X)_2\text{CH}_2\text{OH}$, or CH_2OR^X ; R^Y may also be R^X provided that R^Y and R^X are not simultaneously alkyl;

R^X represents $\text{C}_1\text{-C}_{20}$ alkyl, aryl or aryl-alkyl which may be substituted or unsubstituted by substituents independently selected from the group consisting of hydroxy, oxygen, nitrogen and halogen.

18. The compound of claim 17 wherein R^{31} is 2-methoxyphenyl, 3-methoxyphenyl, 4-methoxyphenyl, 2-fluorophenyl, 3-fluorophenyl, 4-fluorophenyl, 2-ethoxy-5-hydroxyphenyl, 2-ethoxy-4-hydroxyphenyl, 3,5-dimethoxyphenyl, 2,4-difluorophenyl, 2-(haloalkyl)-phenyl, 3-(haloalkyl)phenyl, 4-(haloalkyl)-phenyl, 2-cyanophenyl, 3-cyanophenyl, 4-cyanophenyl, 2-ethoxyphenyl, 2-carboethoxyphenyl, 3-carboethoxyphenyl, 4-carboethoxyphenyl, or 2-haloalkylbenzyl, 3-haloalkylbenzyl or 4-haloalkylbenzyl.

19. The compound of claim 18 wherein B is cytosin-1-yl, 6-azacytosin-1-yl, 5-fluorocytosin-1-yl, adenin-9-yl, guanin-9-yl or 2, 6-diaminopurin-9-yl.

20. A compound of the formula $(\text{L}^1)_2\text{P(O)-Z-B}^1$ or

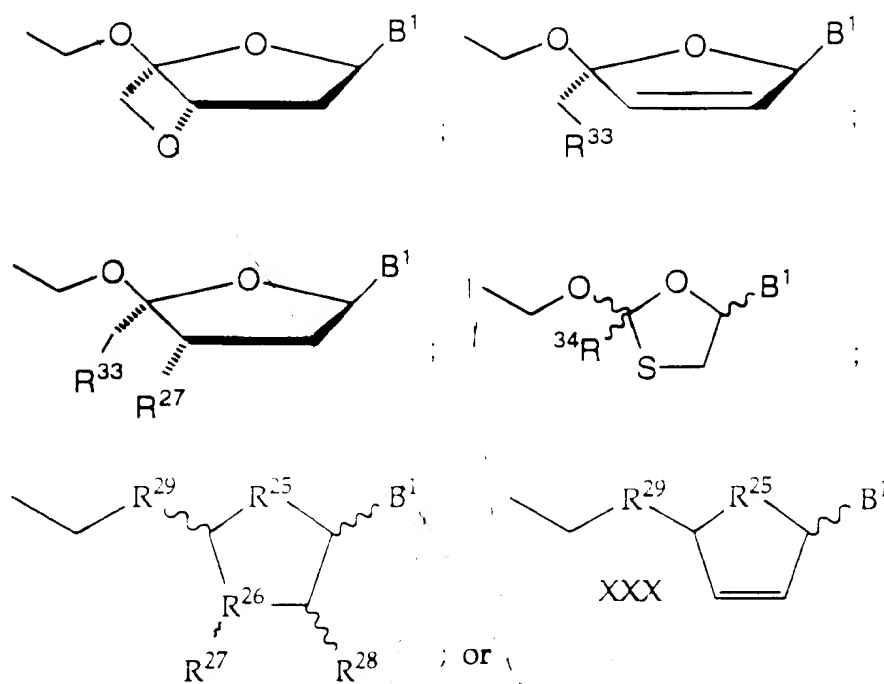


wherein

substituents linked to the carbon atom designated # are in the R, S or RS configuration;

L^1 is independently an amino acid, a polypeptide, an oxyester, a thioester or a substituted or unsubstituted amine;

B¹ is a protected heterocyclic base; and
Z-B¹ is



wherein

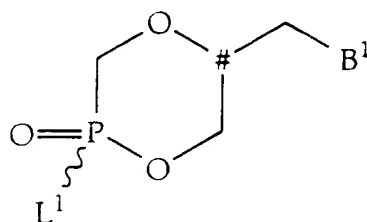
R²⁷ is H, OH, halogen, N₃, C₁-C₄ alkyl, C₁-C₄ alkoxy or when, R²⁶ is S, R²⁷ is absent;

R²⁸ is H, OH, halogen, N₃, C₁-C₄ alkyl or C₁-C₄ alkoxy;

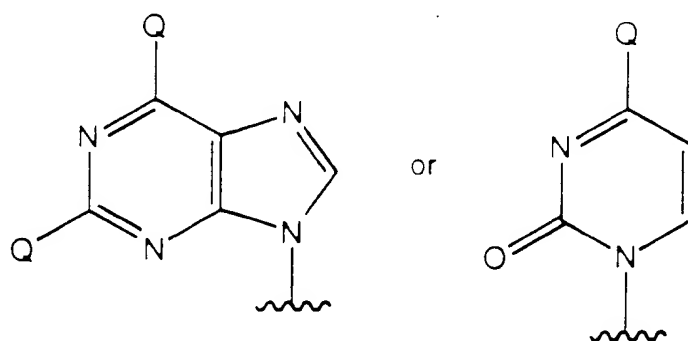
R²⁹ is O, S, CH₂, CHF or CF₂;

R³³ is H, OH, TBSO, halogen, cyano, CH₂N₃, C₁-C₄ alkyl, C₁-C₄ alkoxy, CH₂OH or azido; and

R³⁴ is H, CH₂CN or CF₃, with the proviso that, for structure XXX, when R²⁵ is O or CH₂ and R²⁹ CH₂ or O, L¹ is not H or C₁-C₆ alkyl, provided that for compounds of structure



when B¹ is

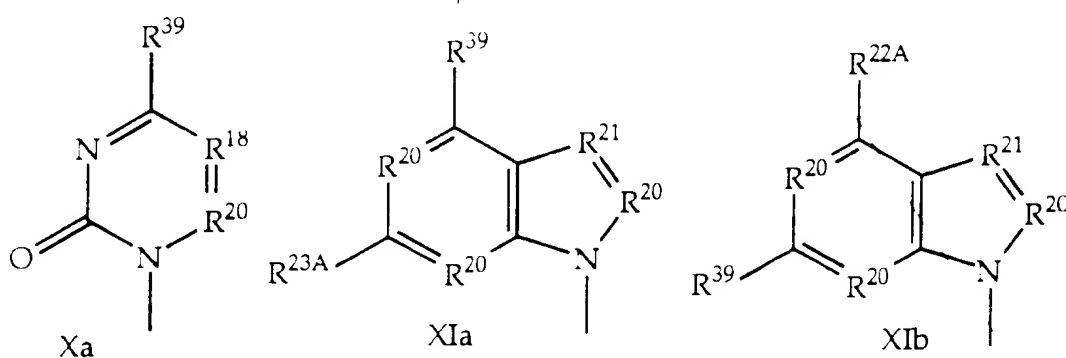


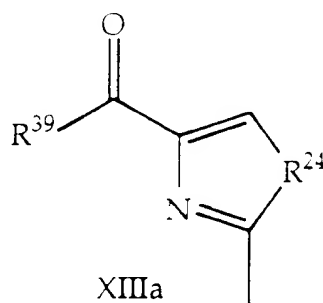
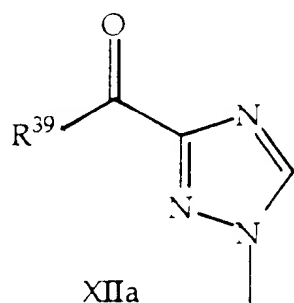
wherein Q is independently chosen from H, Cl, NHR^X , NR^X_2 , NHC(O)R^X , $\text{N(C(O)R}^X)_2$, OH or $\text{NCHN(R}^X)_2$, then L^1 is not OR^Y , NH_2 , NHR^X , or $\text{N(R}^X)_2$ where R^Y represents a physiologically hydrolyzable ester group selected from the group consisting of $\text{CH}_2\text{C(O)N(R}^X)_2$, $\text{CH}_2\text{C(O)OR}^X$, $\text{CH}_2\text{OC(O)R}^X$, $\text{CH(R}^X)\text{OC(O)R}^X$, $\text{CH}_2\text{C(R}^X)_2\text{CH}_2\text{OH}$, or CH_2OR^X ; R^Y may also be R^X provided that R^Y and R^X are not simultaneously alkyl;

R^X represents $\text{C}_1\text{-C}_{20}$ alkyl, aryl or aryl-alkyl which may be substituted or unsubstituted by substituents independently selected from the group consisting of hydroxy, oxygen, nitrogen and halogen;

provided that when R^{25} is O, R^{29} is CH_2 , R^{26} is CH, R^{27} is OH, R^{28} is H or F, and B is adenine, thymine, guanine, cytosine or protected adenine, protected guanine or protected cytosine, both L^1 are not H, methyl or phenyl.

21. The compound of claim 20 wherein B^1 is





wherein

R¹⁸ is N, CF, CCl, CBr, Cl, CR¹⁹ or CSR¹⁹, COR¹⁹;

5 R²⁰ is N or CH;

R²¹ is N, CH, CCN, CCF₃, CC≡CH or CC(O)NH₂;

R^{22A} is R³⁹ or R²² provided that R²² is not NH₂;

R²² is H, OH, NH₂, SH, SCH₃, SCH₂CH₃, SCH₂CCH, SCH₂CHCH₂,
SC₃H₇, NH(CH₃), N(CH₃)₂, NH(CH₂CH₃), N(CH₂CH₃)₂, NH(CH₂CCH),
10 NH(CH₂CHCH₂), NH(C₃H₇) or halogen (F, Cl, Br or I);

R^{23A} is R³⁹ or R²³ provided that R²³ is not NH₂;

R²³ is H, OH, F, Cl, Br, I, SCH₃, SCH₂CH₃, SCH₂CCH, SCH₂CHCH₂,
SC₃H₇, OR¹⁶, NH₂, or NHR¹⁷;

R²⁴ is O, S or Se; and

15 R³⁹ is NHR⁴⁰, NHC(O)R³⁶ or NCR⁴¹N(R³⁸)₂ wherein,

R³⁶ is C₁-C₁₉ alkyl, C₁-C₁₉ alkenyl, C₃-C₁₀ aryl, adamantoyl, alkylanyl, or
C₃-C₁₀ aryl substituted with 1 or 2 atoms or groups selected from halogen,
methyl, ethyl, methoxy, ethoxy, hydroxy and cyano;

20 R³⁸ is C₁-C₁₀ alkyl, or both R³⁸ together are 1-morpholino, 1-piperidine
or 1-pyrrolidine;

R⁴⁰ is C₁₋₂₀ alkyl; and

R⁴¹ is hydrogen or CH₃.

22. The compound of claim 21 wherein L¹ is R or R³¹ wherein

25 R is

C₃-C₂₄ 1-acyloxy-1-alkyl,

C₆-C₂₄ 1-acyloxy-1-aryl-1-alkyl,

C₃-C₂₄ 1-acyloxy-2-alkoxy-1-alkyl,

C₃-C₂₄ 1-acyloxy-2-halo-1-alkyl,

C₁-C₂₀ alkyl which is unsubstituted or substituted by substituents independently selected from the group consisting of OH, O, N and halogen (F, Cl, Br, I),

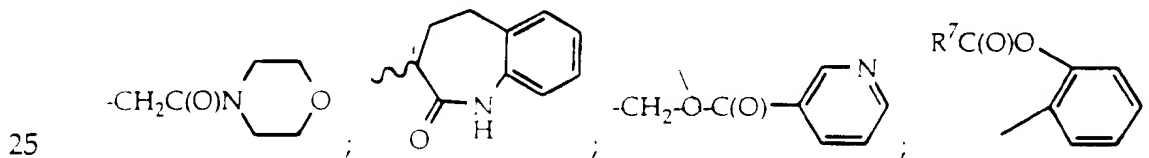
5 C₃-C₂₀ aryl which is unsubstituted or substituted by substituents independently selected from the group consisting of C₁-C₆ alkyl, C₁-C₆ alkoxy, C₁-C₆ haloalkyl (1 to 3 halogen atoms), cyano, nitro, OH, O, N and halogen,

10 C₄-C₂₀ aryl-alkyl which is unsubstituted or substituted in the aryl moiety by substituents independently selected from the group consisting of C₁-C₆ alkyl, C₁-C₆ alkoxy, C₁-C₆ haloalkyl (1 to 3 halogen atoms), cyano, nitro, OH, O, N and halogen,

C₃-C₆ aryl substituted by 3 to 5 halogen atoms or 1 to 2 atoms or groups independently selected from the group consisting of halogen, C₁-C₁₂ alkoxy, cyano, nitro, hydroxy, C₁-C₁₂ haloalkyl, C₁-C₁₂ alkyl, C₂-C₁₂ alkenyl or C₂-C₁₂ alkynyl, or

15 C₁-C₄ alkylene-C₃-C₆ aryl substituted in the aryl moiety by 3 to 5 halogen atoms or 1 to 2 atoms or groups independently selected from the group consisting of halogen, C₁-C₁₂ alkoxy, cyano, nitro, hydroxy, C₁-C₁₂ haloalkyl, C₁-C₁₂ alkyl, C₂-C₁₂ alkenyl or C₂-C₁₂ alkynyl; and

20 R³¹ is 2,3-dihydro-6-hydroxyindene; sesamol; catechol monoester; -CH₂-C(O)-N(R⁷)₂ wherein each R⁷ the same or different; -CH₂-S(O)(R⁷); -CH₂-S(O)₂(R⁷); -O-CH₂-CH(OC(O)CH₂R⁷)-CH₂(OC(O)CH₂R⁷); cholesteryl; a monosaccharide; a disaccharide; an oligosaccharide (3 to 9 monosaccharide residues), enolpyruvate; glycerol; an α-D-β-diglyceride; trimethoxybenzyl; triethoxybenzyl; 2-alkyl pyridinyl (C₁₋₄ alkyl);



C₃-C₆ aryl substituted by 3, 4 or 5 halogen atoms or 1 or 2 atoms or groups selected from halogen, C₁-C₁₂ alkoxy, cyano, nitro, OH, C₁-C₁₂ haloalkyl, C₁-C₁₂ alkyl, C₂-C₁₂ alkenyl or C₂-C₁₂ alkynyl; or

30 C₁-C₄ alkylene-C₃-C₆ aryl substituted in the aryl moiety by 3 to 5 halogen atoms or 1 to 2 atoms or groups selected from halogen, C₁-C₁₂ alkoxy, cyano, nitro, OH, C₁-C₁₂ haloalkyl, C₁-C₁₂ alkyl, C₂-C₁₂ alkenyl or C₂-C₁₂ alkynyl.

23. The compound of claim 21 wherein L^1 is ethylglycine or N-methylglycine.

24. A compound of the formula $(OR^{35})(OR^{35})P(O)-Z-B$, wherein;
B is a heterocyclic base;

R^{35} is independently R or R^{31} , wherein R is independently

H,

C_3-C_{24} 1-acyloxy-1-alkyl,

C_6-C_{24} 1-acyloxy-1-aryl-1-alkyl,

C_3-C_{24} 1-acyloxy-2-alkoxy-1-alkyl,

C_3-C_{24} 1-acyloxy-2-halo-1-alkyl,

C_1-C_{20} alkyl which is unsubstituted or substituted by substituents independently selected from the group consisting of OH, O, N and halogen (F, Cl, Br, I),

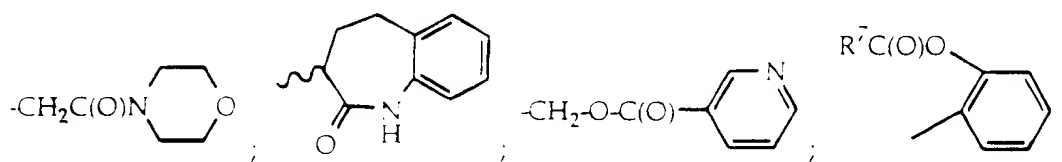
C_3-C_{20} aryl which is unsubstituted or substituted by substituents independently selected from the group consisting of C_1-C_6 alkyl, C_1-C_6 alkoxy, C_1-C_6 haloalkyl (1 to 3 halogen atoms), cyano, nitro, OH, O, N and halogen,

C_4-C_{20} aryl-alkyl which is unsubstituted or substituted in the aryl moiety by substituents independently selected from the group consisting of C_1-C_6 alkyl, C_1-C_6 alkoxy, C_1-C_6 haloalkyl (1 to 3 halogen atoms), cyano, nitro, OH, O, N and halogen,

C_3-C_6 aryl substituted by 3 to 5 halogen atoms or 1 to 2 atoms or groups independently selected from the group consisting of halogen, C_1-C_{12} alkoxy, cyano, nitro, hydroxy, C_1-C_{12} haloalkyl, C_1-C_{12} alkyl, C_2-C_{12} alkenyl or C_2-C_{12} alkynyl, or

C_1-C_4 alkylene- C_3-C_6 aryl substituted in the aryl moiety by 3 to 5 halogen atoms or 1 to 2 atoms or groups independently selected from the group consisting of halogen, C_1-C_{12} alkoxy, cyano, nitro, hydroxy, C_1-C_{12} haloalkyl, C_1-C_{12} alkyl, C_2-C_{12} alkenyl or C_2-C_{12} alkynyl;

R^{31} is 2,3-dihydro-6-hydroxyindene; sesamol; catechol monoester; $-CH_2-C(O)-N(R^7)_2$ wherein each R^7 the same or different; $-CH_2-S(O)(R^7)$; $-CH_2-S(O)_2(R^7)$; $-O-CH_2-CH(OC(O)CH_2R^7)-CH_2(OC(O)CH_2R^7)$; cholesteryl; a monosaccharide; a disaccharide; an oligosaccharide (3 to 9 monosaccharide residues), enolpyruvate; glycerol; an α -D- β -diglyceride; trimethoxybenzyl; triethoxybenzyl; 2-alkyl pyridinyl (C_{1-4} alkyl);

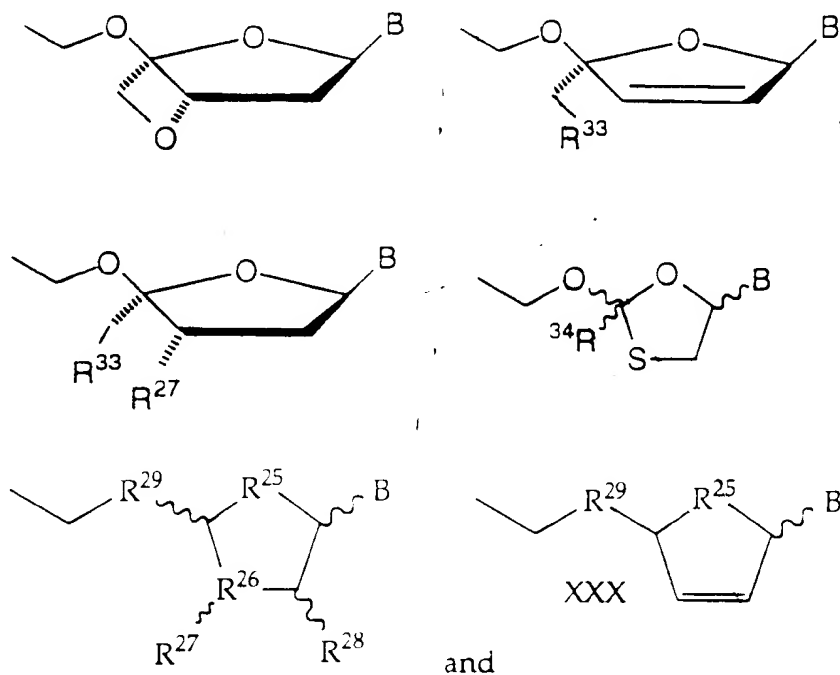


C_3 - C_6 aryl substituted by 3, 4 or 5 halogen atoms or 1 or 2 atoms or groups selected from halogen, C_1 - C_{12} alkoxy, cyano, nitro, OH, C_1 - C_{12} haloalkyl, C_1 - C_{12} alkyl, C_2 - C_{12} alkenyl or C_2 - C_{12} alkynyl; or

- 5 C_1 - C_4 alkylene- C_3 - C_6 aryl substituted in the aryl moiety by 3 to 5 halogen atoms or 1 to 2 atoms or groups selected from halogen, C_1 - C_{12} alkoxy, cyano, nitro, OH, C_1 - C_{12} haloalkyl, C_1 - C_{12} alkyl, C_2 - C_{12} alkenyl or C_2 - C_{12} alkynyl;

Z-B is selected from the group consisting of

10



15

wherein

substituents linked to the carbon atom designated # are in the *R*, *S* or *RS* configuration,

R^{25} is CH_2 , CHF or O;

R^{26} is CH or S, provided that when R^{25} is CH, R^{26} is not S;

- 20 R^{27} is H, OH, halogen, N_3 , C_1 - C_4 alkyl, C_1 - C_4 alkoxy or when, R^{26} is S, R^{27} is absent;

R^{28} is H, OH, halogen, N_3 , C_1 - C_4 alkyl or C_1 - C_4 alkoxy;

R²⁹ is O, S, CH₂, CHF or CF₂;

R³³ is H, OH, TBSO, halogen, cyano, CH₂N₃, C₁-C₄ alkyl, C₁-C₄ alkoxy, CH₂OH or azido; and

R³⁴ is H, CH₂CN or CF₃, with the proviso that, for structure XXX,
5 when R²⁵ is O or CH₂ and R²⁹ CH₂ or O, R³⁵ is not H or C₁-C₆ alkyl; and
provided that when R²⁵ is CH₂, R²⁹ is CH₂, R²⁶ is CH, R²⁷ is H, R²⁸ is H,
and B is adenine, R³⁵ are not both H or C₃H₇; and

provided that when R²⁵ is O, R²⁹ is CH₂, R²⁶ is S, R²⁸ is H, and B is
cytosine or protected cytosine, R³⁵ are not both H or ethyl; and
10 provided that when R²⁵ is CH₂, R²⁹ is O, R²⁶ is CH, R²⁷ is H, R²⁸ is H,
and B is adenine, guanine, hypoxanthine, cytosine, uracil or thymine, R³⁵ are
not both H or C₃H₇; and

provided that when R²⁵ is O, R²⁹ is CH₂, R²⁶ is CH, R²⁷ is N₃, R²⁸ is H,
and B is thymine, R³⁵ is not H or phenyl; and

15 provided that when R²⁵ is CH₂, R²⁹ is O, R²⁶ is CH, R²⁷ is H, R²⁸ is H,
and B is thymine, R³⁵ is not H or C₁-C₆ alkyl; and

provided that when R²⁵ is O, R²⁹ is CH₂, R²⁶ is CH, R²⁷ is OH, R²⁸ is H
or F, and B is adenine, thymine, guanine, cytosine or protected adenine,
protected guanine or protected cytosine, both R³⁵ are not H, methyl or phenyl;
20 and

provided that when R²⁵ is O, R²⁹ is O, R²⁶ is CH, R²⁷ is H, OH or C₁-C₄
alkyl, R²⁸ is H, OH or C₁-C₄ alkyl, and B is xanthine, substituted xanthine,
guanine, substituted guanine, purine, substituted purine, cytosine, substituted
cytosine, thymine, uracil, substituted uracil, adenine or substituted adenine,
25 R³⁵ is not H or C₁-C₆ alkyl.

25. The compound of claim 24 wherein R³⁵ is independently
phenyl, benzyl, adamantoyl oxymethyl, pivaloyloxymethyl, 2-
methoxyphenyl, 3-methoxyphenyl, 4-methoxyphenyl, 2-fluorophenyl, 3-
30 fluorophenyl, 4-fluorophenyl, 2-ethoxy-5-hydroxyphenyl, 2-ethoxy-4-
hydroxyphenyl, 3,5-dimethoxyphenyl, 2,4-difluorophenyl, 2-(haloalkyl)-
phenyl, 3-(haloalkyl)phenyl, 4-(haloalkyl)-phenyl, 2-cyanophenyl, 3-
cyanophenyl, 4-cyanophenyl, 2-ethoxyphenyl, 2-carboethoxyphenyl, 3-
carboethoxyphenyl, 4-carboethoxyphenyl, or 2-haloalkylbenzyl, 3-
35 haloalkylbenzyl or 4-haloalkylbenzyl.

26. The compound of claim 25 wherein B¹ is N⁴-benzoylcytosin-1-yl, N⁴-(6-aminohexyl)cytosin-1-yl, N⁴-(10-aminodecyl)cytosin-1-yl, N⁴-(14-aminolauryl)cytosin-1-yl.

5 27. The compound of claim 1 where L¹ or L² is an immunogenic peptide or protein.

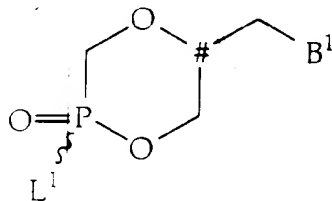
28. An antibody capable of binding specifically to a compound of claim 27.

10

29. A compound of claim 2 for oral administration of an antivirally-effective dose to a subject.

15 30. The compound of claim 29 wherein the compound is enriched or resolved at the phosphate atom chiral center.

31. A compound of claim 20 having the structure

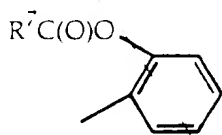


20 for oral administration of antivirally-effective dose to a subject.

32. The compound of claim 31 wherein the compound is enriched or resolved at the phosphate atom chiral center.

25 33. A compound of formula I, wherein the compound is labeled with a detectable moiety selected from the group of an enzyme, radioisotope, stable free radical, fluorophor, and a chemiluminescent group.

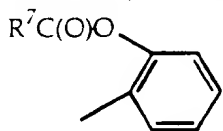
30 34. A compound of the formula (R³¹O)₂P(O)-CH₂-OH or (R³¹O)₂P(OSi(CH₃)₃) wherein
R³¹ is trimethoxybenzyl; triethoxybenzyl; 2-alkyl pyridinyl (C₁₋₄ alkyl);



wherein R^7 is hydrogen or C_{1-4} alkyl; or

C_3-C_6 aryl substituted by 3, 4 or 5 halogen atoms or 1 or 2 atoms or groups selected from halogen, C_1-C_{12} alkoxy, cyano, nitro, C_1-C_{12} haloalkyl, C_1-C_{12} alkyl or C_2-12 alkynyl, provided that for compound $(R^{31}O)_2P(O)-CH_2-OH$, R^{31} is not phenyl.

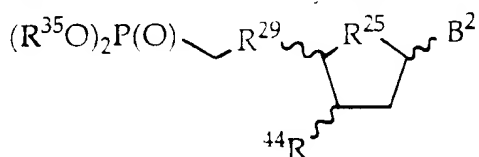
35. A method to synthesize a compound of structure $(R^{31}O)_2P(O)-CH_2-OH$ comprising silylating a compound of structure $(R^{31}O)_2P(O)H$ with about 1 equivalent of bis(trimethylsilyl)trifluoroacetamide, drying the resulting compound and reacting the resulting compound with paraformaldehyde containing catalytic amounts of a lewis acid, wherein R^{31} is trimethoxybenzyl; triethoxybenzyl; 2-alkyl pyridinyl (C_{1-4} alkyl);



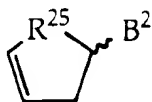
wherein R^7 is hydrogen or C_{1-4} alkyl;

C_3-C_6 aryl substituted by 3, 4 or 5 halogen atoms or 1 or 2 atoms or groups selected from halogen, C_1-C_{12} alkoxy, cyano, nitro, C_1-C_{12} haloalkyl, C_1-C_{12} alkyl or C_2-12 alkynyl.

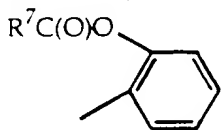
36. A method to synthesize a compound of structure



by reacting a compound of structure



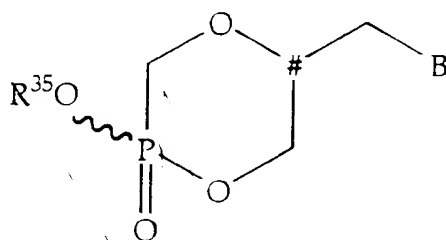
with iodine and $(R^{31}O)_2P(O)-CH_2-OH$ at high temperature, wherein B^2 is a heterocyclic base or a protected heterocyclic base; R^{31} is trimethoxybenzyl; triethoxybenzyl; 2-alkyl pyridinyl (C_{1-4} alkyl);



wherein R^7 is hydrogen or C_{1-4} alkyl;

C₃-C₆ aryl substituted by 3, 4 or 5 halogen atoms or 1 or 2 atoms or groups selected from halogen, C₁-C₁₂ alkoxy, cyano, nitro, C₁-C₁₂ haloalkyl, C₁-C₁₂ alkyl or C₂-C₁₂ alkynyl; and R⁴⁴ is iodine or fluorine.

5 37. A compound having the formula



and stereoisomers and salts of such compounds wherein

B is a purine or pyrimidine base;

10 R³⁵ is R or R³¹;

R is 2-alkoxyphenyl, 3-alkoxyphenyl, 4-alkoxyphenyl (C₁-C₁₂ alkyl), 2-halophenyl, 3-halophenyl, 4-halophenyl, 2,3-dihalophenyl, 2,4-dihalophenyl, 2,5-dihalophenyl, 2,6-dihalophenyl, 3,4-dihalophenyl, 3,5-dihalophenyl, 4-haloalkylphenyl (1-5 halogens, C₁-C₁₂ alkyl), carboalkoxyphenyl (C₁-C₄ alkyl),
 15 2-haloalkylbenzyl, 3-haloalkylbenzyl, 4-haloalkylbenzyl (1 to 5 halogen atoms, C₁-C₁₂ alkyl), alkylsalicylphenyl (C₁-C₄ alkyl), alkoxy ethyl (C₁-C₆ alkyl), aryloxy ethyl (C₆-C₉ aryl optionally substituted by OH, NH₂, halo, C₁-C₄ alkyl or C₁-C₄ alkyl substituted by OH or by 1 to 3 halo atoms), 2-pyrrolyl, 3-pyrrolyl, 2-thienyl, 3-thienyl, 2-imidazolyl, 4-imidazolyl, 2-oxazolyl, 4-oxazolyl, 5-oxazolyl, 3-isoxazolyl, 4-isoxazolyl, 2-thiazolyl, 4-thiazolyl, 5-thiazolyl, 3-isothiazolyl, 4-isothiazolyl, 5-isothiazolyl, 3-pyrazolyl, 4-pyrazolyl, 2-pyridinyl, 3-pyridinyl, 4-pyridinyl, 2-pyrimidinyl, 4-pyrimidinyl, 5-pyrimidinyl, 2-methoxyphenyl, 3-methoxyphenyl, 4-methoxyphenyl, 2-ethoxyphenyl, 3-ethoxyphenyl, 4-ethoxyphenyl, 2-fluorophenyl, 3-fluorophenyl, 4-fluorophenyl, 2,4-difluorophenyl, 2,4-dichlorophenyl, 2-trifluoromethylphenyl, 3-trifluoromethylphenyl, 4-trifluoromethylphenyl, 2-trichloromethylphenyl, 3-trichloromethylphenyl, 4-trichloromethylphenyl, 2-cyanophenyl, 3-cyanophenyl, 4-cyanophenyl, 2-carboethoxyphenyl, 3-carboethoxyphenyl, 4-carboethoxyphenyl (-C₆H₄-C(O)-OC₂H₅), 2,3-dicarboethoxyphenyl, 2,4-dicarboethoxyphenyl, 2,5-dicarboethoxyphenyl, 2,6-dicarboethoxyphenyl, 3,4-dicarboethoxyphenyl, 3,5-dicarboethoxyphenyl, 1-pyridinyl, 2-pyridinyl, 3-pyridinyl, 4-pyridinyl (-C₅H₄N), 2-nitrophenyl, 3-

nitrophenyl, 4-nitrophenyl, 4-trifluoromethylbenzyl, 2-ethylsalicylphenyl, 3-ethylsalicylphenyl, 4-ethylsalicylphenyl, 2-acetylphenyl, 3-acetylphenyl, 4-acetylphenyl, 1,8-dihydroxy-naphthyl (-O-C₁₀H₆-OH or -O-C₁₀H₆-O-), 2,2'-dihydroxybiphenyl (-O-C₆H₄-C₆H₄-O-), methoxy ethyl (-CH₂-CH₂-O-CH₃),
5 phoxymethyl, phenoxy ethyl, -C₆H₄-CH₂-N(CH₃)₂ or N-ethylmorpholino
-(CH₂)₂-N[(CH₂)₂(CH₂)₂O];

R³¹ is 2,3-dihydro-6-hydroxyindene, sesamol, catechol monoester,
-CH₂-C(O)-N(R⁷)₂ wherein each R⁷ is the same or different, -CH₂-S(O)(R⁷),
-CH₂-S(O)₂(R⁷), -O-CH₂-CH(OC(O)CH₂R⁷)-CH₂(OC(O)CH₂R⁷), cholesteryl,
10 enolpyruvate, glycerol, an α-D-β-diglyceride, trimethoxybenzyl,
triethoxybenzyl or 2-alkyl pyridinyl (C₁₋₄ alkyl);

R⁷ is H or C₁-C₄ alkyl; and

the carbon atom designated # has linked substituents that are in the R,
S or RS configuration.

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38. The compound of claim 37 wherein R³⁵ is R.

39. The compound of claim 37 wherein R is 2-alkoxyphenyl, 3-alkoxyphenyl, 4-alkoxyphenyl (C₁-C₁₂ alkyl), 2-halophenyl, 3-halophenyl, 4-halophenyl, 2,3-dihalophenyl, 2,4-dihalophenyl, 2,5-dihalophenyl, 2,6-dihalophenyl, 3,4-dihalophenyl, 3,5-dihalophenyl, 4-haloalkylphenyl (1-5 halogens, C₁-C₁₂ alkyl), carbalkoxyphenyl (C₁-C₄ alkyl), 2-haloalkylbenzyl, 3-haloalkylbenzyl, 4-haloalkylbenzyl (1 to 5 halogen atoms, C₁-C₁₂ alkyl), alkylsalicylphenyl (C₁-C₄ alkyl), alkoxy ethyl (C₁-C₆ alkyl) or aryloxy ethyl (C₆-
20 C₉ aryl optionally substituted by OH, NH₂, halo, C₁-C₄ alkyl or C₁-C₄ alkyl substituted by OH or by 1 to 3 halo atoms).

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40. The compound of claim 39 wherein B is cytosine, 5-fluorocytosine, 5-methylcytosine, adenine, guanine, 2,6-diaminopurine, 2-aminopurine, hypoxanthine or thymine.

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41. The compound of claim 39 wherein R is alkylsalicylphenyl.

42. The compound of claim 41 wherein B is cytosine.

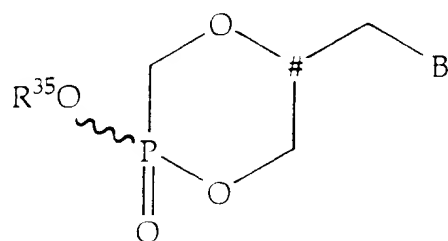
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43. The compound of claim 37 wherein R is 2-pyrrolyl, 3-pyrrolyl, 2-thienyl, 3-thienyl, 2-imidazolyl, 4-imidazolyl, 2-oxazolyl, 4-oxazolyl, 5-oxazolyl, 3-isoxazolyl, 4-isoxazolyl, 2-thiazolyl, 4-thiazolyl, 5-thiazolyl, 3-isothiazolyl, 4-isothiazolyl, 5-isothiazolyl, 3-pyrazolyl, 4-pyrazolyl, 2-pyridinyl, 3-pyridinyl, 4-pyridinyl, 2-pyrimidinyl, 4-pyrimidinyl, 5-pyrimidinyl, 2-methoxyphenyl, 3-methoxyphenyl, 4-methoxyphenyl, 2-ethoxyphenyl, 3-ethoxyphenyl, 4-ethoxyphenyl, 2-fluorophenyl, 3-fluorophenyl, 4-fluorophenyl, 2,4-difluorophenyl, 2,4-dichlorophenyl, 2-trifluoromethylphenyl, 3-trifluoromethylphenyl, 4-trifluoromethylphenyl, 2-trichloromethylphenyl, 3-trichloromethylphenyl, 4-trichloromethylphenyl, 2-cyanophenyl, 3-cyanophenyl, 4-cyanophenyl, 2-carboethoxyphenyl, 3-carboethoxyphenyl, 4-carboethoxyphenyl ($-C_6H_4-C(O)-OC_2H_5$), 2,3-dicarboethoxyphenyl, 2,4-dicarboethoxyphenyl, 2,5-dicarboethoxyphenyl, 2,6-dicarboethoxyphenyl, 3,4-dicarboethoxyphenyl, 3,5-dicarboethoxyphenyl, 1-pyridinyl, 2-pyridinyl, 3-pyridinyl, 4-pyridinyl ($-C_5H_4N$), 2-nitrophenyl, 3-nitrophenyl, 4-nitrophenyl, 4-trifluoromethylbenzyl, 2-ethylsalicylphenyl, 3-ethylsalicylphenyl, 4-ethylsalicylphenyl, 2-acetylphenyl, 3-acetylphenyl, 4-acetylphenyl, 1,8-dihydroxy-naphthyl ($-O-C_{10}H_6-OH$ or $-O-C_{10}H_6-O-$), 2,2'-dihydroxybiphenyl ($-O-C_6H_4-C_6H_4-O-$), methoxy ethyl ($-CH_2-CH_2-O-CH_3$), phenoxymethyl, phenoxy ethyl, $-C_6H_4-CH_2-N(CH_3)_2$ or N-ethylmorpholino ($-(CH_2)_2-N[(CH_2)_2(CH_2)_2]O$).

44. The compound of claim 43 wherein B is cytosine, 5-fluorocytosine, 5-methylcytosine, adenine, guanine, 2,6-diaminopurine, 2-aminopurine, hypoxanthine or thymine.

45. The compound of claim 37 wherein B is cytosine, 5-fluorocytosine, 5-methylcytosine, adenine, guanine, 2,6-diaminopurine, 2-aminopurine, hypoxanthine or thymine.

46. The use of a compound having the formula



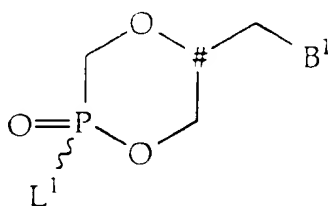
and salts of such compounds wherein the carbon atom designated # has linked substituents that are in the *R*, *S* or *RS* configuration, B is cytosine and R^{35} is alkylsalicylphenyl (C_1 - C_4 alkyl) in the preparation of a medicament for treating a viral infection by administering an antivirally-effective dose of the compound to an infected subject.

47. The use of the compound in accordance with claim 46 wherein the compound is enriched or resolved at the phosphate atom chiral center.

48. The use of a compound of claim 2 in the preparation of a medicament for treating a viral infection by administering an antivirally-effective dose of the compound to an infected subject.

49. The use of the compound in accordance with claim 48 wherein the compound is enriched or resolved at the phosphate atom chiral center.

50. The use of a compound of claim 20 having the structure



in the preparation of a medicament for treating a viral infection by administering an antivirally-effective dose of the compound to an infected subject.

51. The use of the compound in accordance with claim 50 wherein the compound is enriched or resolved at the phosphate atom chiral center.